ROYAL ASTRONOMICAL SOCIETY.

Vol. VI. *January* 12, 1844. No. 3.

Francis Baily, Esq., President, in the Chair.

The following communications were read :—

I. On the Advantages of employing Large Specula and Elevated Situations for Astronomical Observations. By C. Piazzi Smyth, Esq. Communicated by Captain W. H. Smyth, R.N.

The author adverts to methods proposed by Mr. H. F. Talbot for the multiplication of copies of specula by means of the electrotype, and for observing astronomical objects with a telescope absolutely fixed, by means of a revolving plane mirror, which methods he considers might, if carried out, produce great improvements in astronomy. Amongst the advantages of the latter method he enumerates the following, arising chiefly from the unlimited focal length which it would be possible to give to the mirror: First, The obviation of the necessity of an accurate parabolic shape for the reflector; Secondly, The magnifying of the image without distortion or colour; Thirdly, The small effect which inaccuracies of the screw of the micrometer would produce, eye-pieces of low power being employed; Fourthly, The elimination of errors dependent on the contraction or expansion of the tubes of telescopes; and lastly, The advantage of having the eye in a fixed position.

The author then enlarges on the advantages which would attend the use of such a fixed telescope if placed on the slope of a high mountain, with the object-mirror and the eye-piece fixed on piers, and separated by a considerable interval, the mirror being beneath. The Nilgherry hills in India he instances as being favourable for the purpose, the climate being particularly well suited for astronomical observations. He then answers the obvious objection of the impossibility of reflecting objects from every part of the heavens to the speculum, by assuming that it would be most advantageous for astronomical science that every observatory should confine itself to those classes of objects which its geographical position enables it most readily to command. He finally dwells upon the cheapness of the labour of computation in India, arising from the circumstance of the great number of Brahmin priests who are willing and competent to undertake the labour for a very trifling remuneration.

II. Observations of the Planet Uranus, made in the year 1843. By C. Rumker, Esq. Communicated by Dr. Lee.

The observations extend from September 10 to October 31. They are corrected for refraction, but not for parallax.

III. A letter was read from Professor Schumacher to Mr. Baily, dated January 5, 1844, enclosing the Elements of the New Comet, computed by Dr. Goldschmidt, at the request of Professor Gauss, and which are as follows:—

Epoch of Mean Longitude, 1843, Dec^{r}. 2^{d}·11876 Berlin mean time, 58° 31′ 39″ (from the apparent equinox).

Mean Daily Motion	535″·7079
Perihelion	52° 32′ 55″
Angle of Eccentricity	31 29 39
Log. Semi-axis Major	0·5473857
Node	208° 21′ 20″
Inclination	10 58 58

And he remarks that, if the observations of the comet that have recently been made can be depended on, the orbit approaches the nearest to a circle of any that are yet known.

IV. On the Orbit of the Comet of Faye. By Professor Henderson.

Professor Challis had the kindness to communicate to me the following places of the comet observed at Cambridge. They were determined by comparison with 23 and 32 *Orionis*, and he believes that they are pretty accurate.

Mean Time from Greenwich Mean Noon.	Apparent R. A. of Comet.	Apparent N. P. D. of Comet.
	h m s	° ′ ″
1843 Nov. 29 11 12 23	5 21 37·5	84 24 55
Dec. 8 9 59 18	5 17 28·7	85 47 53
16 11 55 45	5 13 33·0	86 35 55

Suspecting that the great differences between the elements of the two parabolic orbits which I formerly communicated, might arise from errors in the observations employed, I proceeded to investigate the elements anew from the Cambridge observations. I followed the method of Olbers, and, after repeated approximations, the best parabolic orbit which I obtained, differing considerably from both the former, did not represent the middle observation to within six minutes of space.

This quantity being much too great to be imputed to error of observation, I concluded that the orbit was not parabolic, this supposition seeming to explain the discordances of the elements.

I next investigated the conic section in which the comet moves, according to the method of Gauss in the *Theoria Motus Corporum Celestium*, employing the three observations at Cambridge; and I

obtained an elliptic orbit, whose period of revolution is about six years and a half. The elements are

Time of Perihelion Passage, Oct. 23^{d}·6970 Greenwich mean time.

Longitude of Perihelion	52° 57′ 52″	mean eq. of 1844·0.
Longitude of ascending Node	208 7 28	
Inclination	10 55 23	
Eccentricity	sin 31 20 58	
Logarithm of Semi-axis Major	0·545352	
Mean Daily Motion	539″·484	
Time of Revolution	6·57702 sidereal years.	

Motion Direct.

The following expressions for the comet's co-ordinates enable its geocentric positions to be more readily computed :—

$x = [0\cdot50302] \sin (e + 138^{\circ}\ 5'\ 32'') - 1\cdot10654$
$y = [0\cdot50843] \sin (e + 55\ 35\ 24) - 1\cdot38397$
$z = [9\cdot94451] \sin (e + 74\ 56\ 11) - 0\cdot44213$

e denoting the eccentric anomaly.

The errors of the computed places for all the observations which have reached me are as follows :—

		R.A.	Declination.
		″	″
Nov. 22	Paris	− 303	− 19
24	Paris	− 1	+ 7
29	Cambridge	+ 18	+ 10
	Kensington	+ 3	+ 1
	Greenwich	+ 42	+ 2
Dec. 2	Edinburgh	− 6	− 17
8	Cambridge	+ 15	+ 12
15	Edinburgh	+ 7	+ 46
16	Cambridge	+ 23	+ 12
25	Edinburgh	− 40	+ 23

The first observation of right ascension at Paris must be affected with a considerable error.

It is very desirable that the comet should be observed for as long a period as possible. The following ephemeris for 10^{h} 30^{m} Greenwich mean time, indicates its position :—

Day.	Right Ascension.	Declination.	Distance from Sun.	Distance from Earth.
1844.	h m s	° ′		
Jan. 11	5 8 20	+3 36	1·843	0·973
15	5 9 12	3 55	1·858	1·008
19	5 10 36	4 17	1·873	1·046
23	5 12 28	4 42	1·889	1·087
27	5 14 44	5 8	1·906	1·130
31	5 17 32	5 35	1·923	1·176
Feb. 4	5 20 44	6 4	1·941	1·222
8	5 24 16	6 31	1·959	1·270
12	5 28 16	+6 58	1·977	1·320

In several respects this comet is very remarkable; and it may afford room for speculation regarding its identity with the lost comet of 1770. The orbit resembles more nearly the elliptical orbits of the planets than those of the periodic comets yet known. In its aphelion and perihelion it approaches nearly the orbits of Jupiter and Mars; and it must occasionally experience great perturbations from the former. It also passes within comparatively small distances of the orbits of the minor planets.

I have to-day received Professor Schumacher's circular, dated the 5th instant, communicating Dr. Goldschmidt's elements, which are nearly the same as mine. They may be considered as confirming each other.

I obtained an observation of the comet on December 25. Another on December 20 is not yet reduced, the star of comparison being undetermined.

	Mean time at Edinburgh.	R.A.	Declination.
	h m s	h m s	° ′ ″
December 25.....	11 31 58	5 10 4·6	+3 1 42

Edinburgh, January 10, 1844.

V. A Letter from Professor Henderson announcing an additional Observation of the Comet of Faye.

"*Edinburgh, January* 10, 1844.

"This evening the comet was barely visible in my telescope, a 5-feet achromatic, with an object-glass of 3·6 inches. It was seen only at times, according to the varying clearness of the sky. At $9^h\ 44^m\ 24^s$ the right ascension was $5^h\ 8^m\ 28^s{\cdot}1$; the declination estimated $+\ 3°\ 29'$. The right ascension observed exceeds that deduced from the ephemeris by 16 seconds of time.

"T. Henderson."

VI. Elements of the Comet of Faye, computed by J. C. Adams, Esq. of St. John's College, Cambridge. Communicated by Professor Challis.

The observations used were made with the Northumberland Telescope of the Cambridge Observatory; and the deduced places are as follows:

Greenwich Mean Solar Time.	Apparent R. A. of Comet.	Apparent N. P. D. of Comet.
h m s	h m s	° ′ ″
Nov. 29, 11 12 23	5 21 37·5	84 24 55
Dec. 8, 9 59 18	5 17 28·7	85 47 53
16, 11 55 45	5 13 33·0	86 35 55

Mr. Adams had previously computed the orbit by the method of Olbers, on the supposition of its being a parabola, but he found that the middle observation was so badly represented, that this

hypothesis could not be correct. He then proceeded to determine the elements without making any hypothesis as to the conic section, and the resulting elements are as follows :

Perihelion passage, 1843, October 26^{d}·33 Greenwich mean time.

Longitude of Perihelion on the Orbit	54° 27′ 8	From the equinox of Dec. 5.
Longitude of ascending Node	207 38·0	
Inclination to the Ecliptic	10 48·9	
Perihelion Distance	1·687	
Semi-axis Major	3·444	
Eccentricity	0·510	
Periodic Time	6·39	Sidereal years.

Motion direct.

The author suggests that the comet may, perhaps, not have been moving long in its present orbit, and that, as in the case of the comet of 1770, we are indebted to the action of *Jupiter* for its present apparition. In fact, supposing the above elements to be correct, the aphelion distance is very nearly equal to the distance of *Jupiter* from the sun: also the time of the comet's being in aphelion was 1843·8 — 3·2 = 1840·6, at which time its heliocentric longitude was 234°·5 nearly, and the longitude of *Jupiter* was 231°·5; and, therefore, since the inclination to the plane of *Jupiter's* orbit is also small, the comet must have been very near *Jupiter* when in aphelion, and must have suffered very great perturbations, which may have materially changed the nature of its orbit.

VII. Observations of the Comet of Faye. By C. Rumker, Esq. Communicated by Dr. Lee.

Day, 1843.	Mean Time at Hamburg.	App. Right Asc. of the Comet.	App. N. Dec. of the Comet.	Number of Observations.
	h m s	° ′ ″	° ′ ″	
Dec. 1	10 33 46·0	80 11 55·78	5 14 44·4	14
1	12 39 53·3		5 13 52·2	Merid. Circle.
9	10 41 9·4	79 14 42·89	4 4 39·1	10
9	12 4 46·2		4 4 30·6	Merid. Circle.
10	9 52 15·2	79 7 18·72	3 58 8·2	22
11	9 51 5·1	79 0 7·74	3 51 37·2	17
13	8 30 46·5	78 45 45·10	3 39 56·7	12
15	11 45 26·0	78 30 22·45	3 29 11·2	11
15	12 17 58·0		3 28 40·8	Merid. Circle.
17	8 4 49·6	78 18 3·67	3 20 42·1	17

VIII. Observations of the Comet of Faye, made at Starfield. By W. Lassell, Esq.

The author thinks that the observations given may be relied upon to within one second of time, and eight or ten seconds of declina-

tion. They were made with the 9-feet equatoreal, used differentially, comparing the place of the comet with the stars 23 and 30 *Orionis*, and one or two small stars near them.

The following are the resulting places:—

Mean Time of Observation.	Apparent Right Ascension.	Apparent Declination.
1843 h m	h m s	° ′ ″
Dec. 12 9 57	5 15 29·1	+3 44 46·4
13 10 30	5 14 59·7	3 39 1·6
14 10 58	5 14 30·7	3 33 38·0
22 10 38	5 10 56·0	3 5 25·0

IX. The following Communications respecting the great Comet of 1843:—

1. Observations of the Comet, made by J. Burdwood, Esq., Master of H. M. Sloop Persian. Communicated by G. B. Airy, Esq.

The comet was seen very distinctly for several successive evenings in March, while the vessel was cruising off the western coast of Africa, between 0° 40′ east, and 0° 13′ west longitude; and between 5° 10′ and 5° 30′ north latitude. The following distances were observed with the sextant on the evening of March 7, at $7^h\ 10^m$ P.M.:—

	° ′
Distance from Aldebaran	60 29
— Canopus	75 57
— Sirius	84 0
Length of Tail	27 25

2. Remarks on the Comet, as seen on Board the Lawrence, of Liverpool, on her passage from Sidney to Conception. By a Passenger. Communicated by W. Simms, Esq.

The comet was first seen on the 1st of March, at $8\frac{1}{2}$ P.M., as a white streak of light, inclined at an angle of 40° to the horizon, and was imagined to be the zodiacal light. It was again seen on the 6th, when the tail was 50° in length, in two streams of light, the outside edges being clear and well defined. On the 9th, the nucleus was seen, and appeared as bright as stars of the third or fourth magnitude. It was seen at intervals till the 28th of March.

3. Abstract of an Article in *Silliman's Journal*, containing an Account of Observations of the great Comet, made near the time of its Perihelion Passage. By J. G. Clarke, Esq., of Portland.

Mr. Clarke measured the distance of the nucleus from the sun on the 28th of February, and states, that the nucleus and every part of the tail, as seen by him in strong sunshine, were as well defined as the moon on a clear day, and resembled a perfectly pure

white cloud, without any variation, except a slight change near the head, just sufficient to distinguish the nucleus from the tail at that point. The denseness of the nucleus was so great that Mr. Clarke has no doubt that it might have been visible upon the sun's disc, if it had passed between it and the observer. This apparent density he attributes to the foreshortening of the tail, and its being so directed to the earth that the nucleus must have been seen through a considerable mass of the matter of the tail. The following distances were measured with a reflecting instrument: —

	d	h	m	s					
Feb.	28	3	2	15	P.M.	Distance of Sun's farthest Limb from nearest Limb of Nucleus	4°	6′	15″
„		3	6	20	P.M.	„ Sun's farthest Limb from farthest Limb of Nucleus	4	7	30
„		3	9	40	P.M.	„ Sun's farthest Limb from Extremity of Tail.....	5	6	30

Mr. Clarke supposes the first of these measures to be correct within 15″; the other two are given as near approximations. Allowance must, of course, be made for the motion of the two bodies during the time of observation. When the sun was on the meridian, the angle made by the line joining the centres of the sun and the nucleus with the lower vertical, on the eastern side, was about seventy-three degrees.

X. On the Deducing of the Parallax of *Mars*, and hence that of the Sun from the Geocentric Motion of the former when in opposition, and especially when near the Node of his Orbit. By S. M. Drach, Esq.

The author, after alluding to the method of determining the solar parallax from observations of the transits of the inferior planets over the sun's disk, states his method as follows: —

" The counterpart of the above is the simultaneous observation at different points of the earth's surface, of the time occupied by a superior planet, when near opposition and near the node, in passing through a certain interval of space, say about half a degree (the sun's diameter); but as this happens at night, comparison stars are to be used, and the interval assumed to be nearly equivalent to their distance. Thus, *e. g.*, if *Mars* be the object observed, and at Greenwich x minutes are occupied by it in describing an arc which it requires only y minutes to describe at the Cape of Good Hope, then will the difference $x-y$, properly applied, give the parallax of *Mars*, and hence that of the sun."

XI. A Letter from Sir J. F. W. Herschel, Bart., to Mr. Baily, dated 6th Sept., 1842, on the Increase in Magnitude of the Star *η Cygni*.

" I beg to call your attention to the star *η Cygni* (21 *Cygni*, Fl.; Piaz. xix. 344), which appears to have increased in magnitude very considerably since the date of Piazzi's observations. It is

now the principal star in the neck of the *Swan*, and of nearly the fourth magnitude,—very conspicuous to the naked eye, and marking, in fact, the only *very* distinctly seizable point between *Albireo* in the beak, and the bright star γ in the body. Now, Piazzi, from nineteen observations in right ascension, and eleven in declination, sets it down as of the 5·6 mag. It does not occur in the Astronomical Society's Catalogue. The star b^2 *Cygni*, which does occur in that Catalogue, is there set down as of the 5th mag. which is also what I make it, or, rather above than under; but η is now a much more distinguished star.

"I may also take this opportunity to mention that the star 34 *Cygni*, the celebrated variable star discovered by Janson in 1600, whose period is 18 years, is now at or near its maximum; at least, it is a star of full the 5th mag. and very nearly equal to b^2 and b^3.

"Bode, on the authority of Lalande, has placed in his maps a star of the 4th mag., with the letter *i* attached, near η *Lyræ*. I can find no star in the place laid down visible in an opera-glass. It is the star 153 *Lyræ*, of Bode's Catalogue.

"I cannot but suspect several other stars in this constellation of variation; at least, I find the greatest discordance between the actual aspect of many regions within its extent and the magnitudes as laid down by Bode. Harding's maps, however, agree better. In Harding's, however, η is marked of the same magnitude with b^2."

London:—Printed by Moyes and Barclay, Castle Street, Leicester Square.